0061012E2E6960

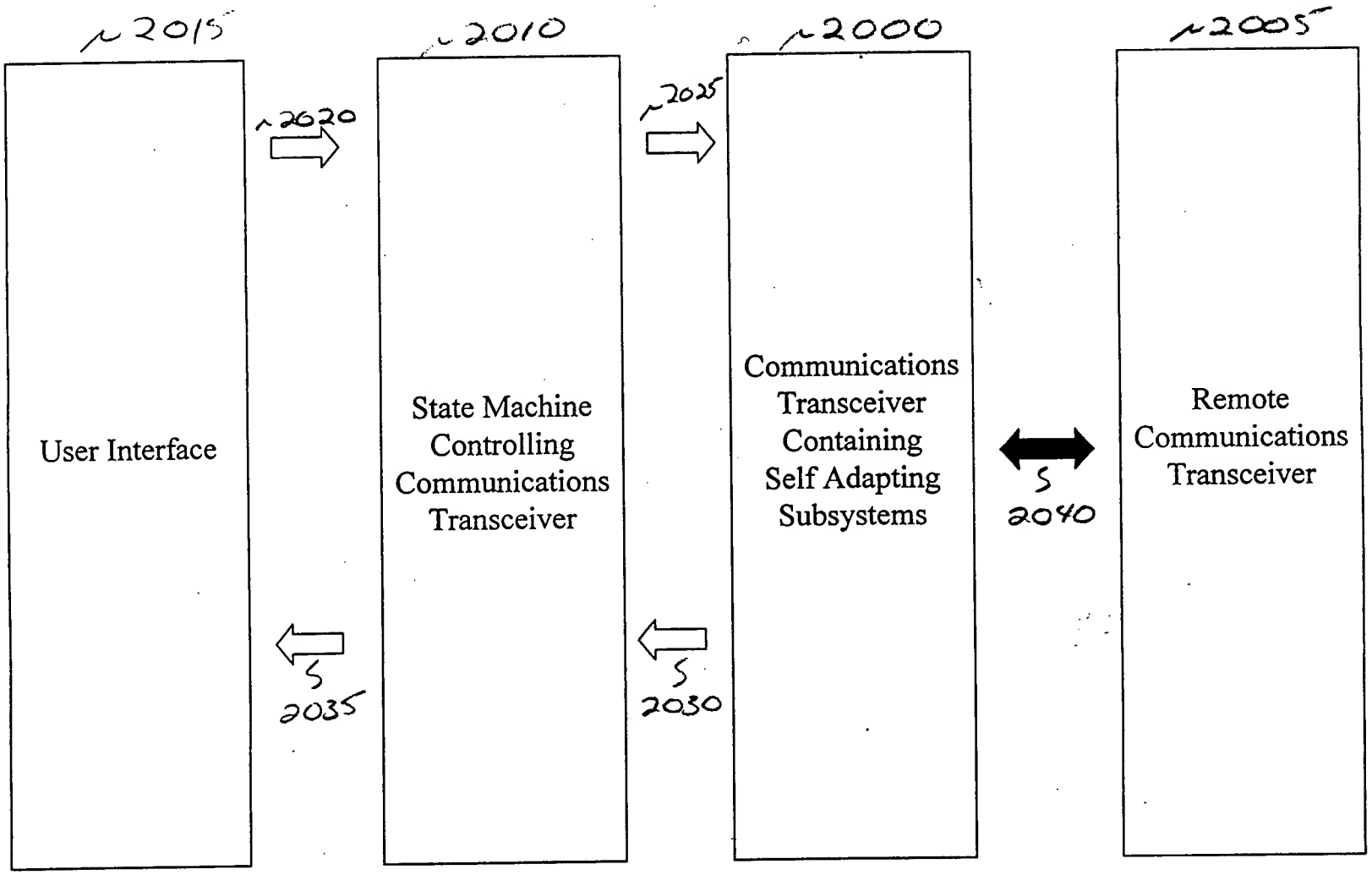

FIG. 1

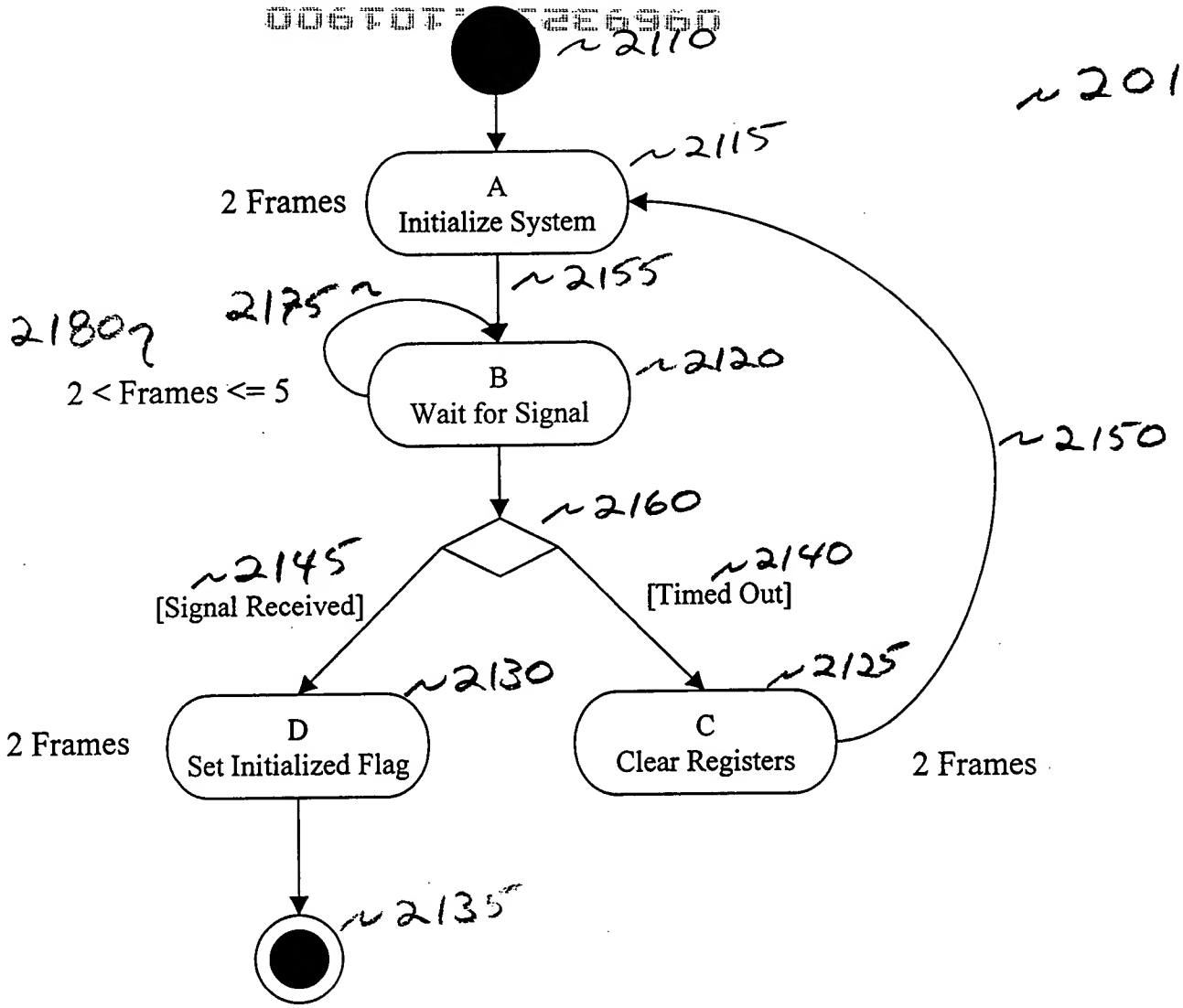
2110
2010
2115
2 Frames
A
Initialize System
2155
2175
2180
2 < Frames <= 5
B
Wait for Signal
2120
2150
2160
2145
[Signal Received]
2140
[Timed Out]
2130
2125
2 Frames
D
Set Initialized Flag
C
Clear Registers
2 Frames
2135

FIG. 2

Expected Patterns

System Fails To Initialize

AABBBBBCCAABBBBBCCAABBBBBCCAABBBBBCC... ~2165

System Initialized

AABBDDHHH...~2170

FIG. 3

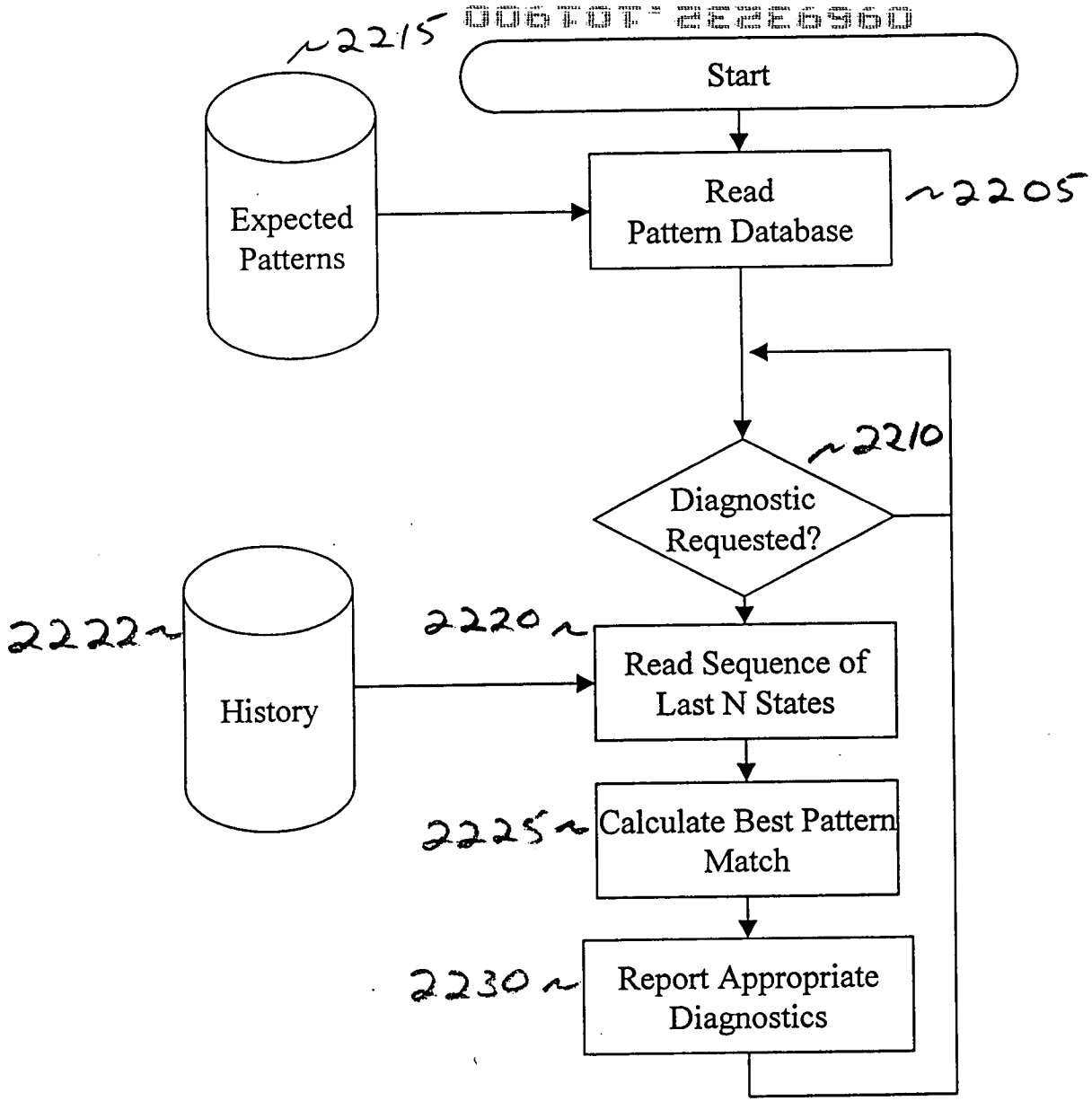
2215
Start
2200
Expected Patterns
Read Pattern Database
2205
2210
Diagnostic Requested?
2222
History
2220
Read Sequence of Last N States
2225
Calculate Best Pattern Match
2230
Report Appropriate Diagnostics

FIG. 4

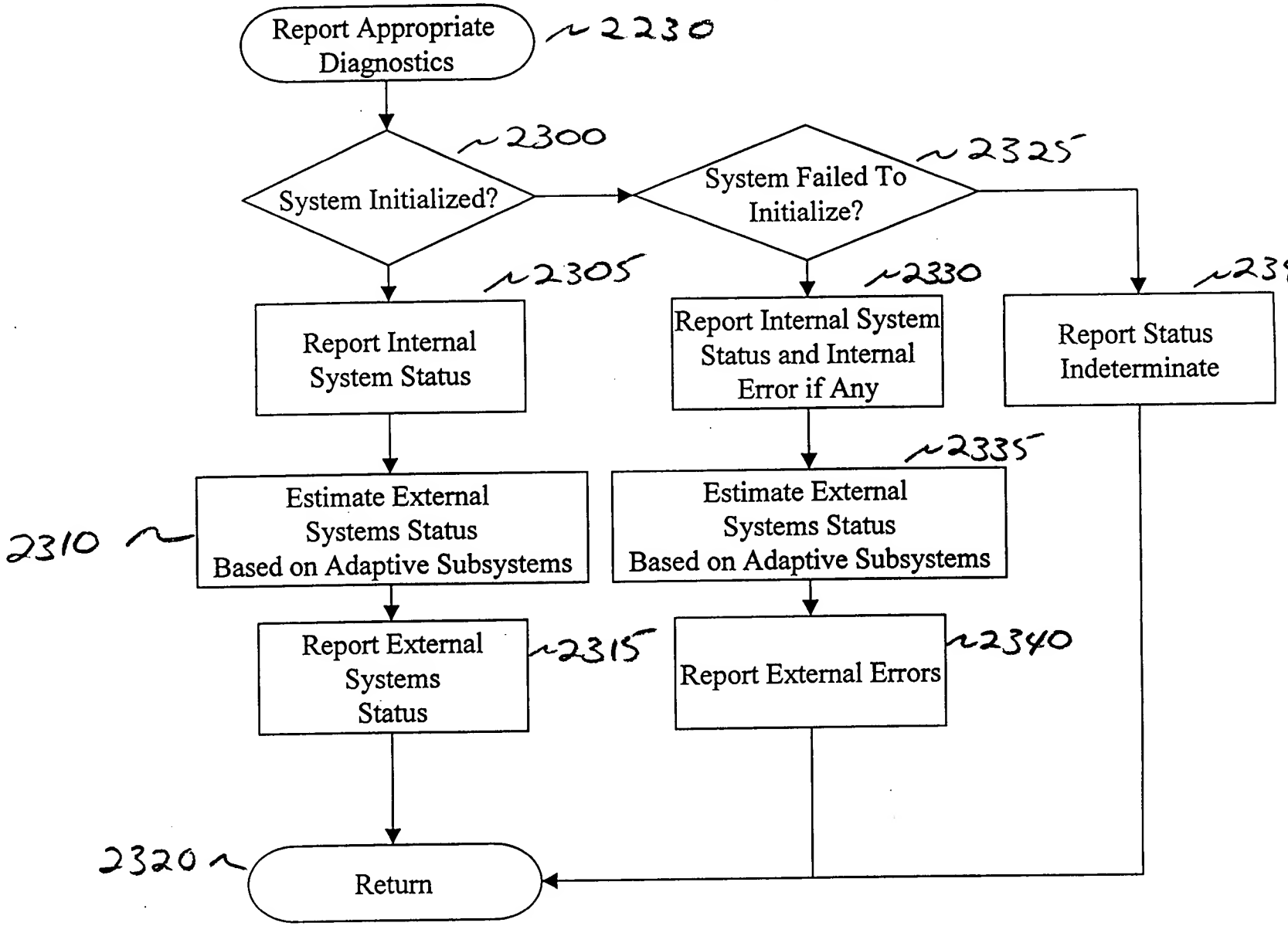
Report Appropriate Diagnostics
2230
System Initialized?
2300
System Failed To Initialize?
2325
Report Internal System Status
2305
Report Internal System Status and Internal Error if Any
2330
Report Status Indeterminate
2345
Estimate External Systems Status Based on Adaptive Subsystems
2310
Estimate External Systems Status Based on Adaptive Subsystems
2335
Report External Systems Status
2315
Report External Errors
2340
Return
2320

FIG. 5

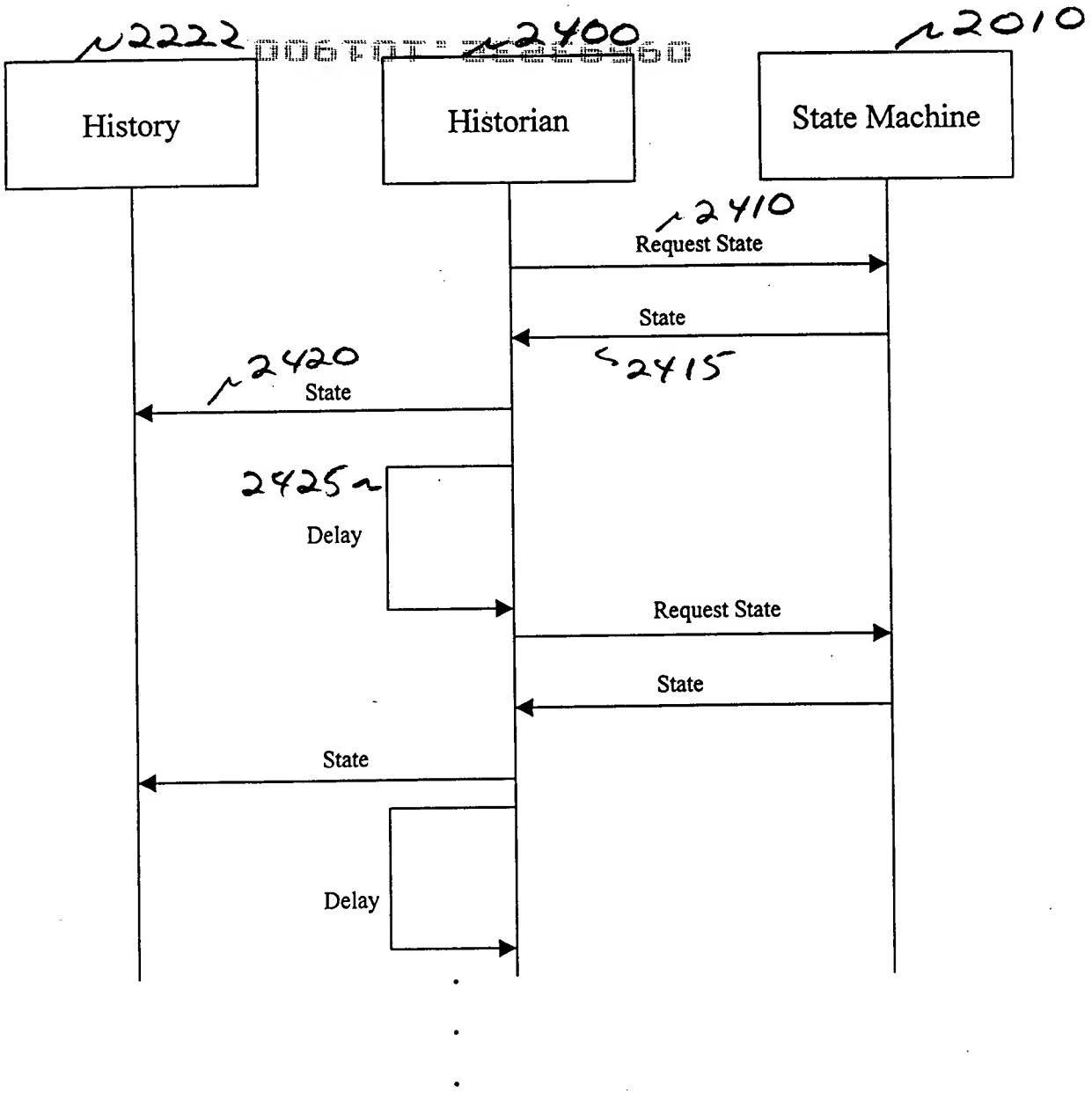
2222
2400
2010
History
Historian
State Machine
2410
Request State
State
2415
2420
State
2425
Delay
Request State
State
State
Delay

FIG. 6

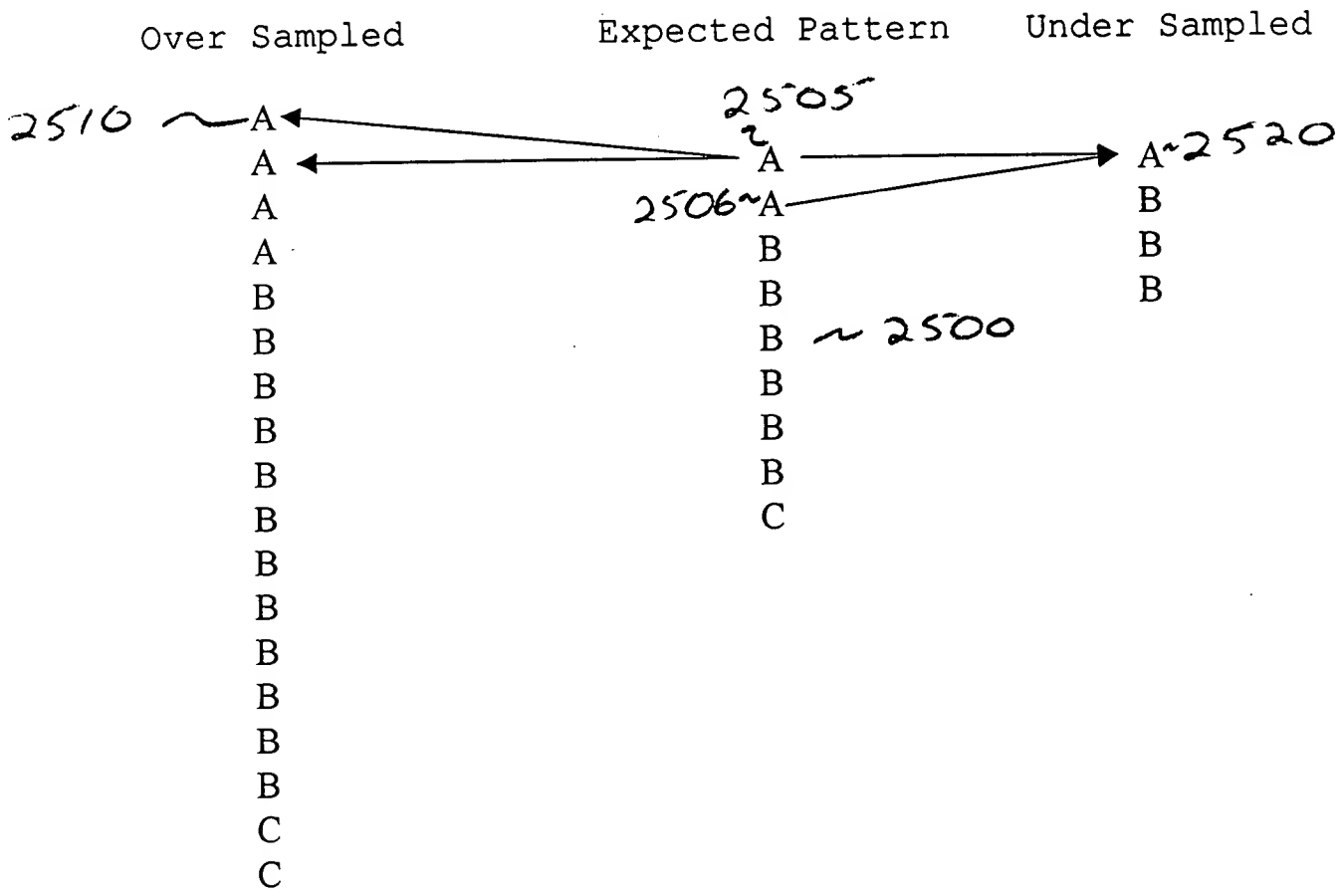
Over Sampled
Expected Pattern
Under Sampled
2510
2505
2506
2500
2520
A
A
A
A
B
B
B
B
B
B
B
B
B
B
B
B
B
B
C
C
A
A
A
B
B
B
B
B
B
B
B
C
A
B
B
B

FIG. 7

006707 2626960

State Machine Sequence

ABBBBBDDHH ~2600

Approximate String Matching

System Initialized

AABBBDDHH ~2610

010001010 ~2620

ABBBBBDDH ~2600

Distance = 3 ~2625

System Not Initialized

AABBBBBBC ~2615

010000111 ~2630

ABBBBBDDH ~2600

Distance = 4 ~2635

FIG. 8

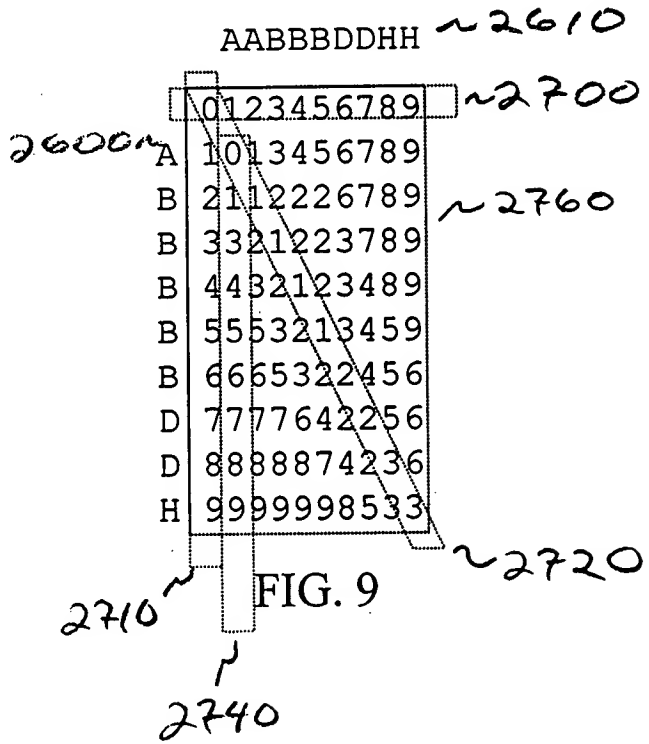

FIG. 9

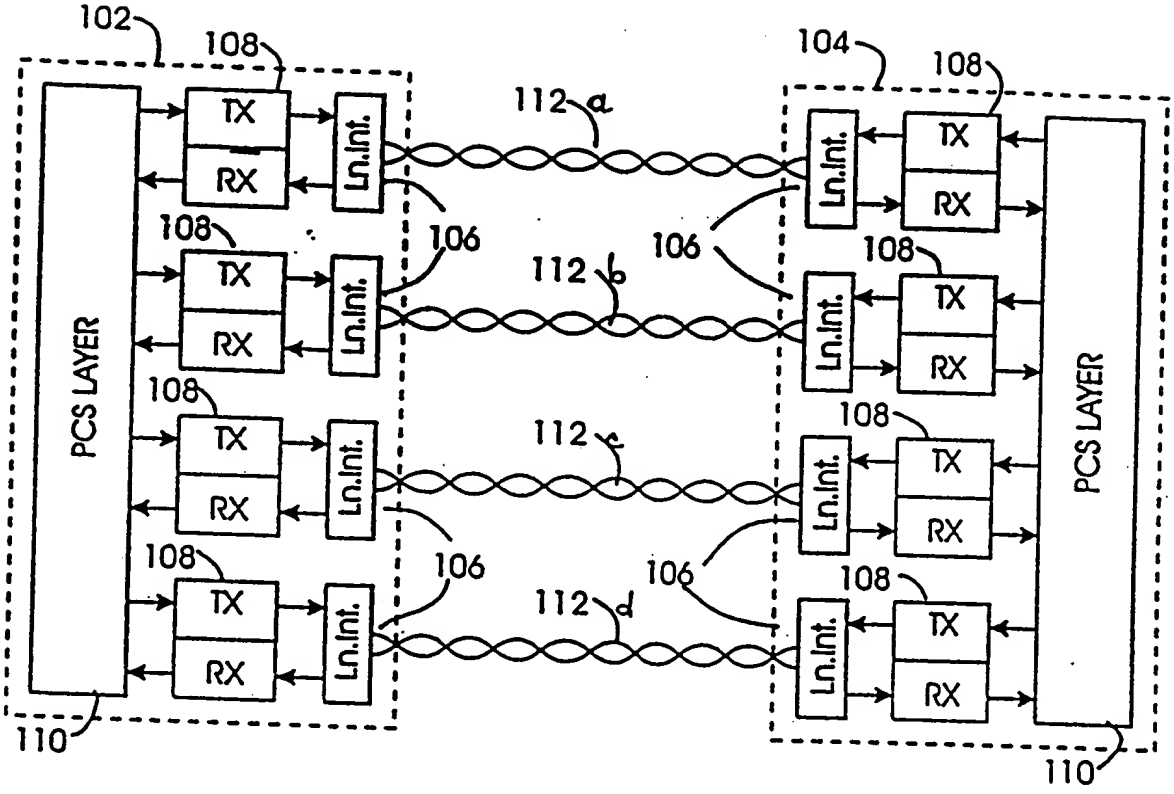
102
108
104
108
112
a
TX
RX
Ln.Int.
106
108
112
b
106
108
PCS LAYER
108
112
c
108
106
112
d
106
108
110
110

FIG. 10

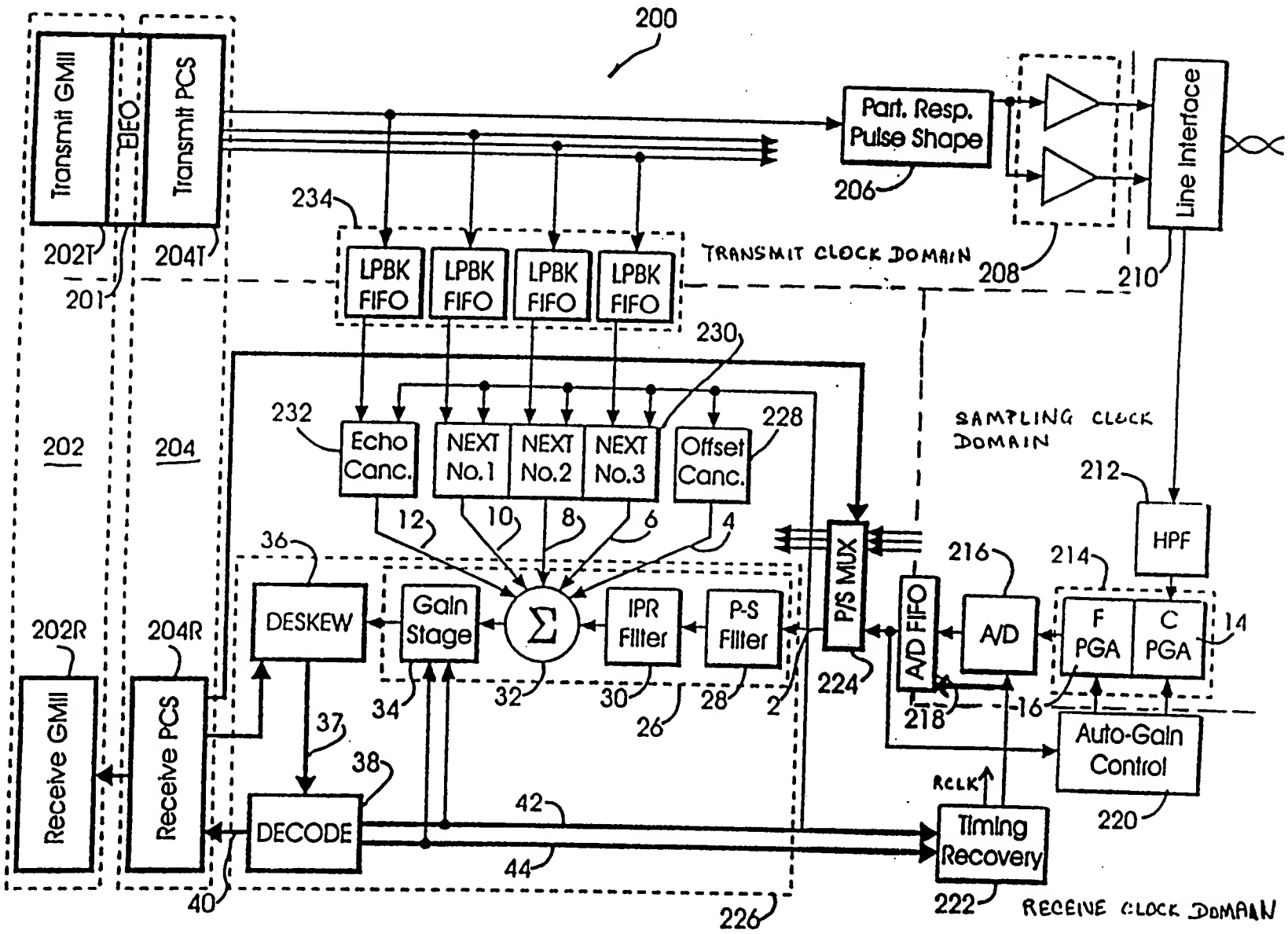
200
Transmit GMII
MEO
Transmit PCS
202T
204T
201
Part. Resp. Pulse Shape
206
Line Interface
208
210
234
LPBK FIFO
LPBK FIFO
LPBK FIFO
LPBK FIFO
TRANSMIT CLOCK DOMAIN
230
232
Echo Canc.
NEXT No.1
NEXT No.2
NEXT No.3
Offset Canc.
228
SAMPLING CLOCK DOMAIN
202
204
212
HPF
12
10
8
6
4
36
DESKEW
Gain Stage
Σ
IPR Filter
P-S Filter
P/S MUX
216
214
A/D FIFO
A/D
F PGA
C PGA
14
202R
204R
34
32
30
28
26
2
224
218
16
Auto-Gain Control
37
38
RCLK
42
DECODE
Timing Recovery
220
Receive GMII
Receive PCS
44
40
226
222
RECEIVE CLOCK DOMAIN

FIG. 11

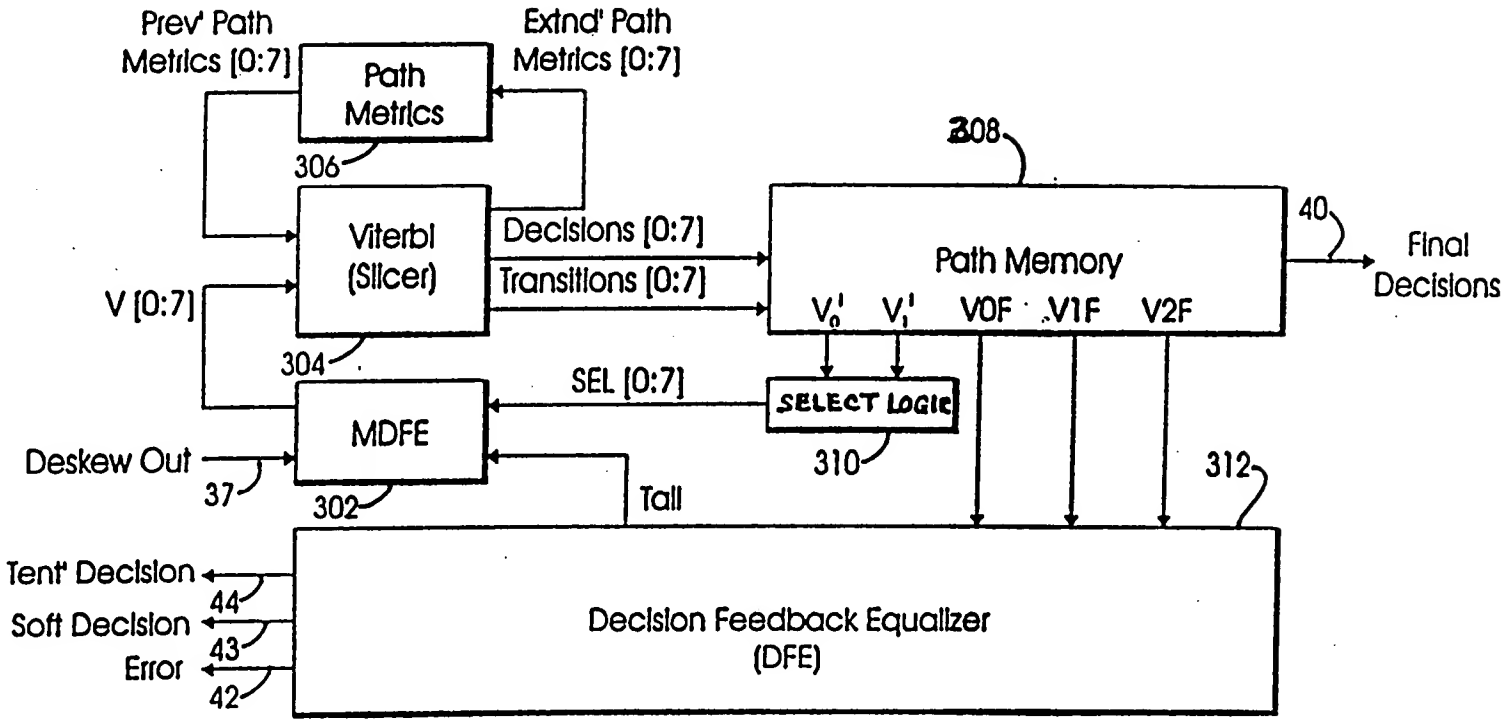
Prev' Path Metrics [0:7]
Extnd' Path Metrics [0:7]
Path Metrics
306
308
Viterbi (Slicer)
Decisions [0:7]
Transitions [0:7]
Path Memory
40
Final Decisions
V [0:7]
V_0' V_1' V0F V1F V2F
304
SEL [0:7]
SELECT LOGIC
MDFE
310
Deskew Out
37
302
Tail
312
Tent' Decision
Soft Decision
Error
44
43
42
Decision Feedback Equalizer (DFE)

FIG. 12

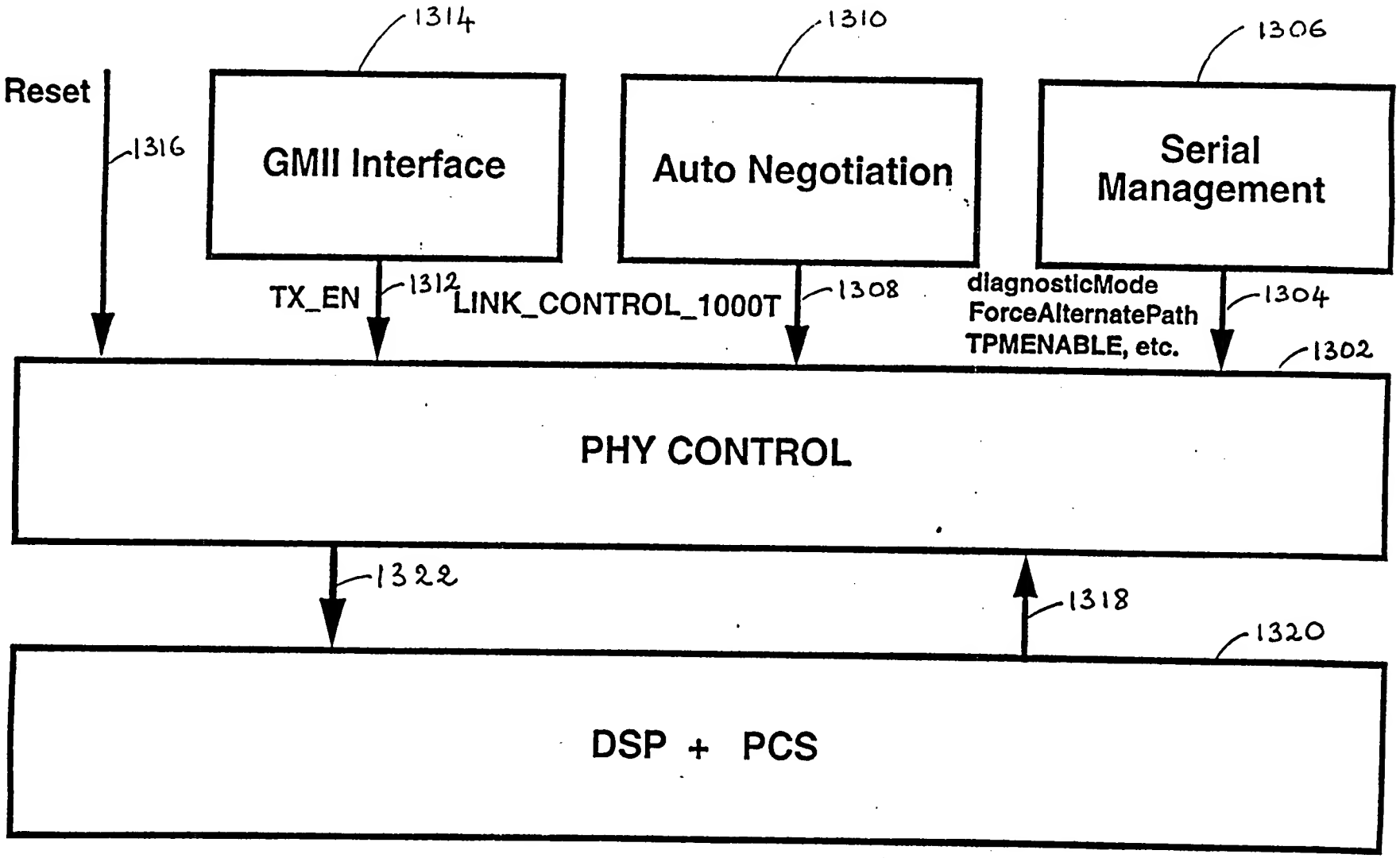
1314
1310
1306
Reset
1316
GMII Interface
Auto Negotiation
Serial Management
TX_EN
1312
LINK_CONTROL_1000T
1308
diagnosticMode
ForceAlternatePath
TPMENABLE, etc.
1304
1302
PHY CONTROL
1322
1318
1320
DSP + PCS

FIG. 13

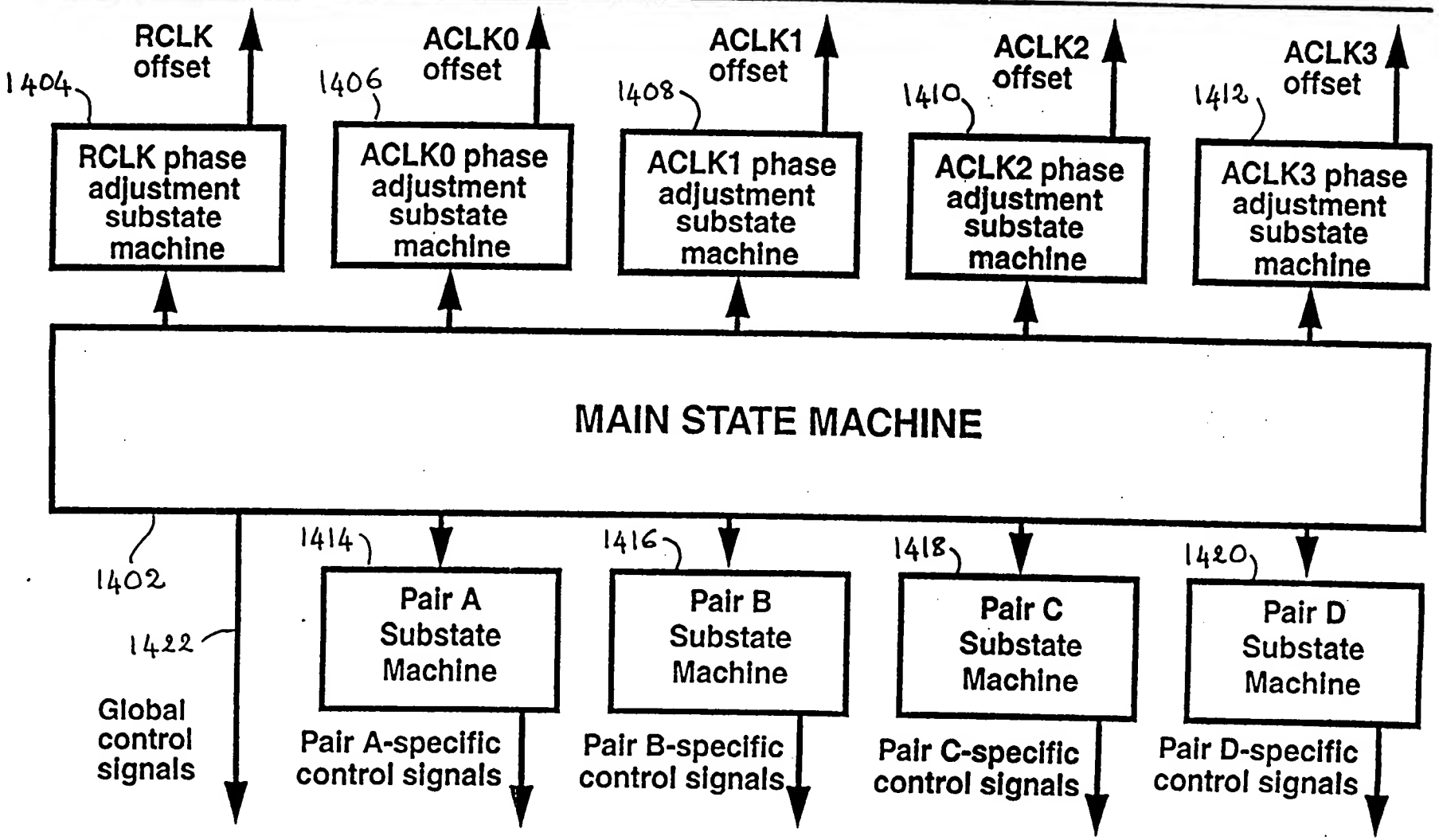
RCLK offset
ACLK0 offset
ACLK1 offset
ACLK2 offset
ACLK3 offset
1404
1406
1408
1410
1412
RCLK phase adjustment substate machine
ACLK0 phase adjustment substate machine
ACLK1 phase adjustment substate machine
ACLK2 phase adjustment substate machine
ACLK3 phase adjustment substate machine
MAIN STATE MACHINE
1402
1422
Global control signals
1414
1416
1418
1420
Pair A Substate Machine
Pair B Substate Machine
Pair C Substate Machine
Pair D Substate Machine
Pair A-specific control signals
Pair B-specific control signals
Pair C-specific control signals
Pair D-specific control signals

FIG. 14

06T0T 2626960

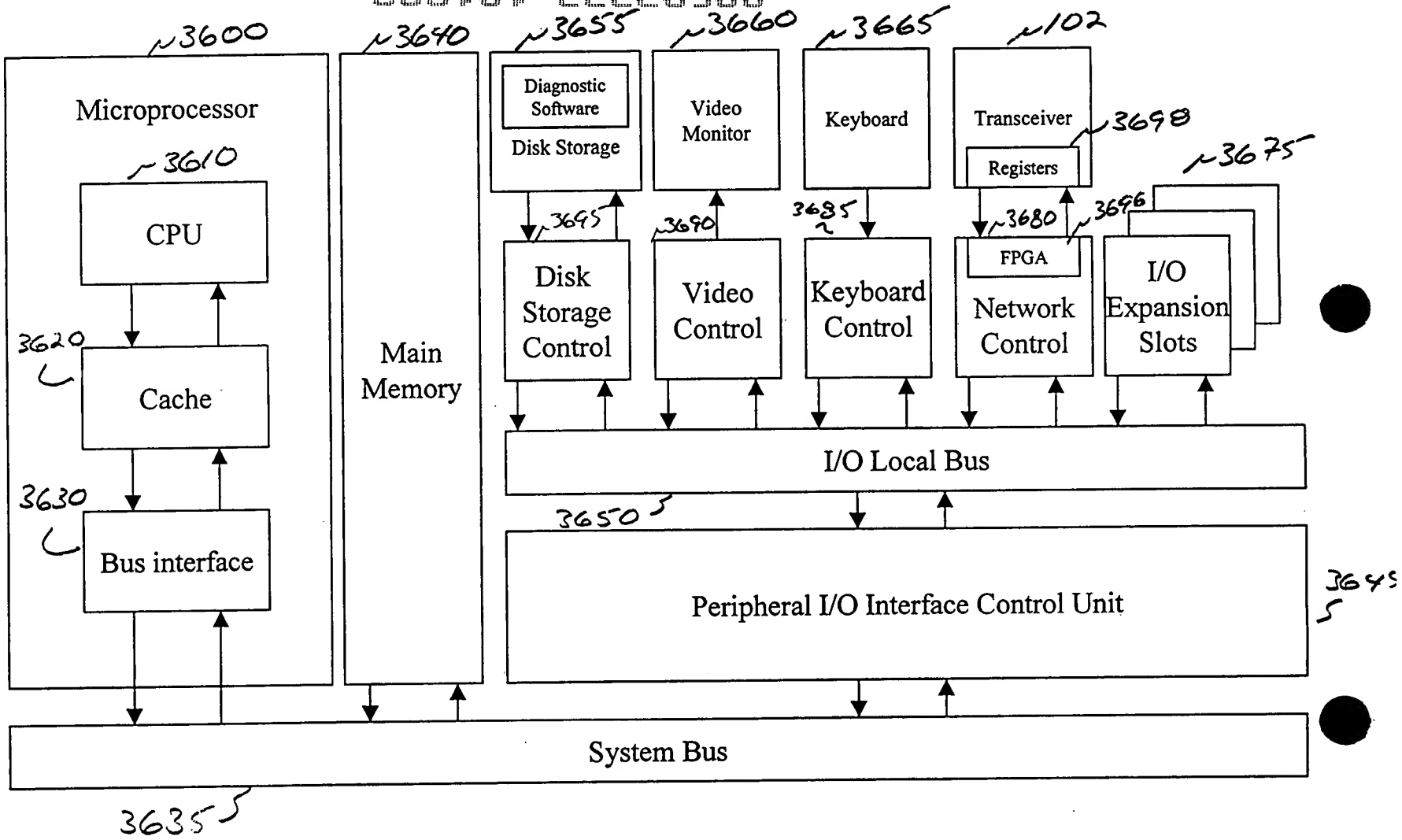

FIG. 15

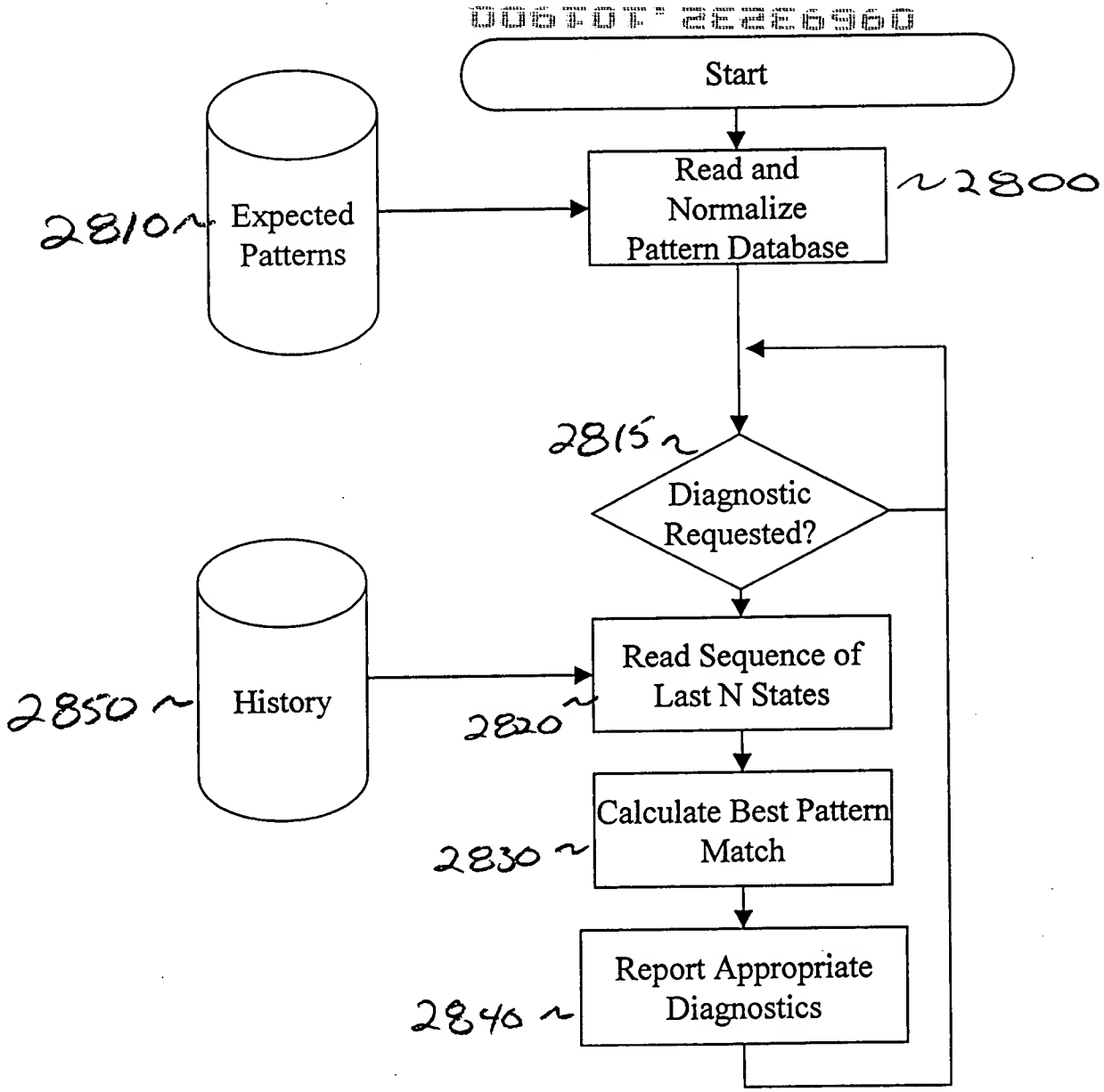
Start
Read and Normalize Pattern Database
2800
2810
Expected Patterns
2815
Diagnostic Requested?
2850
History
Read Sequence of Last N States
2820
Calculate Best Pattern Match
2830
Report Appropriate Diagnostics
2840

FIG. 16

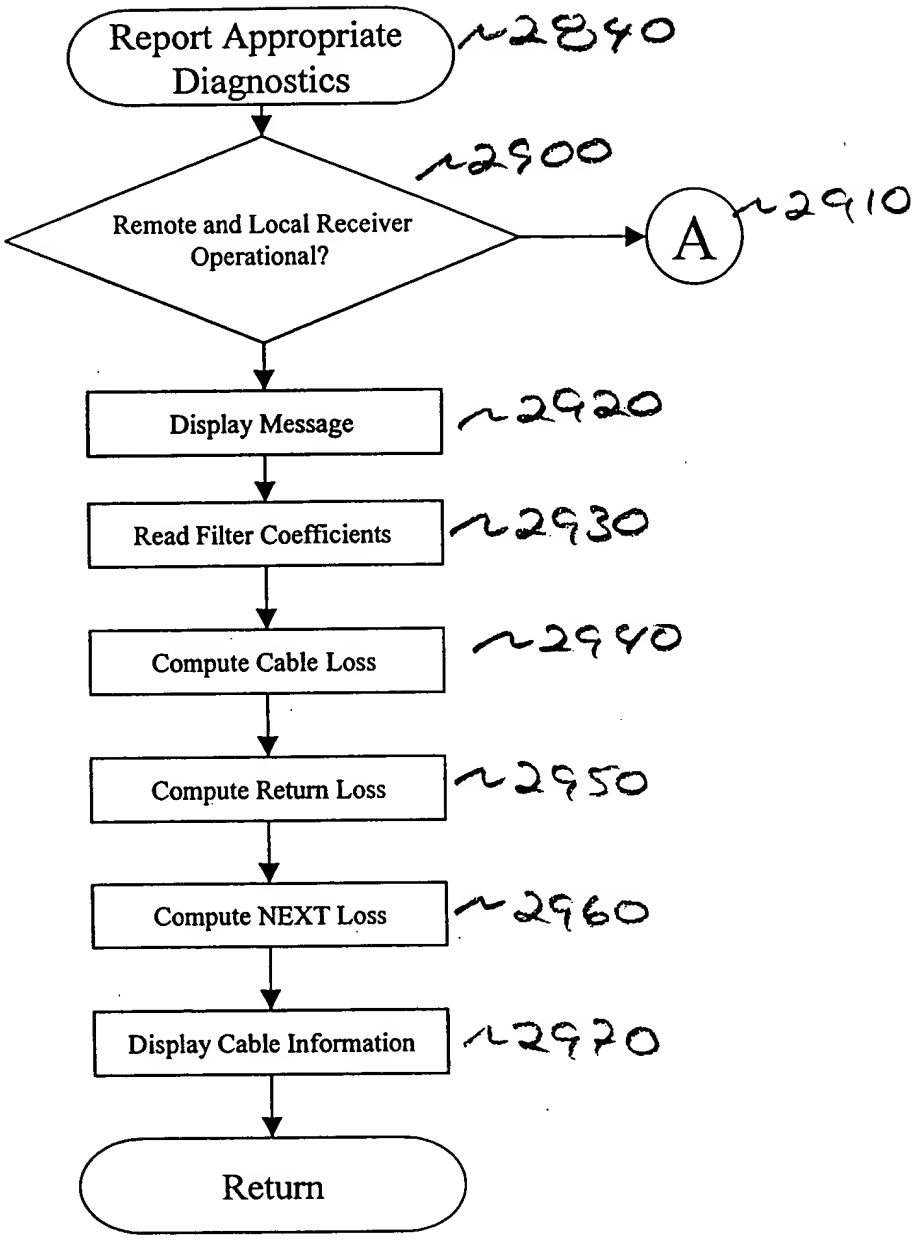
Report Appropriate Diagnostics
2840
2900
Remote and Local Receiver Operational?
A
2910
Display Message
2920
Read Filter Coefficients
2930
Compute Cable Loss
2940
Compute Return Loss
2950
Compute NEXT Loss
2960
Display Cable Information
2970
Return

FIG. 17

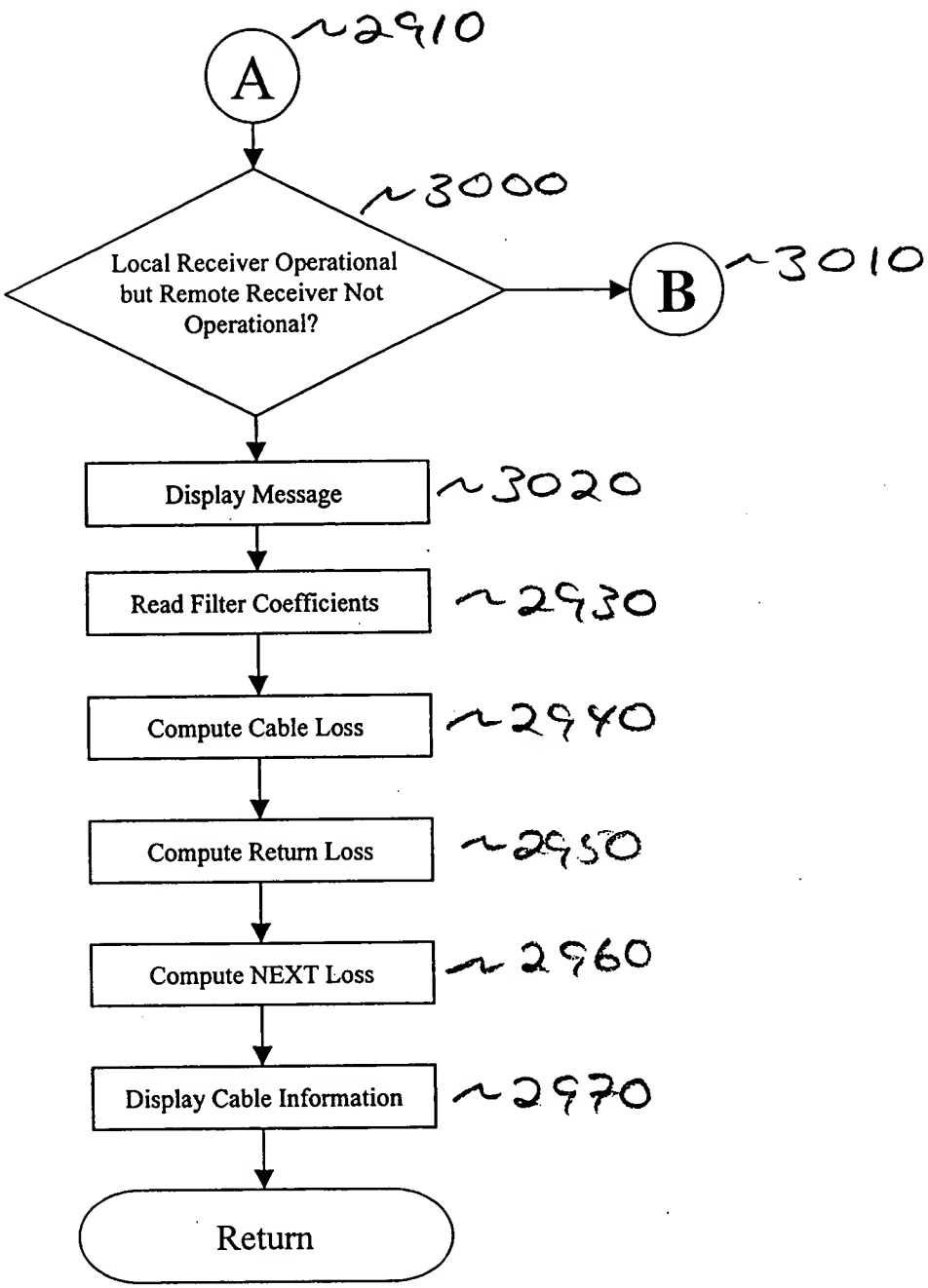
A
2910
3000
Local Receiver Operational but Remote Receiver Not Operational?
B
3010
Display Message
3020
Read Filter Coefficients
2930
Compute Cable Loss
2940
Compute Return Loss
2950
Compute NEXT Loss
2960
Display Cable Information
2970
Return

FIG. 18

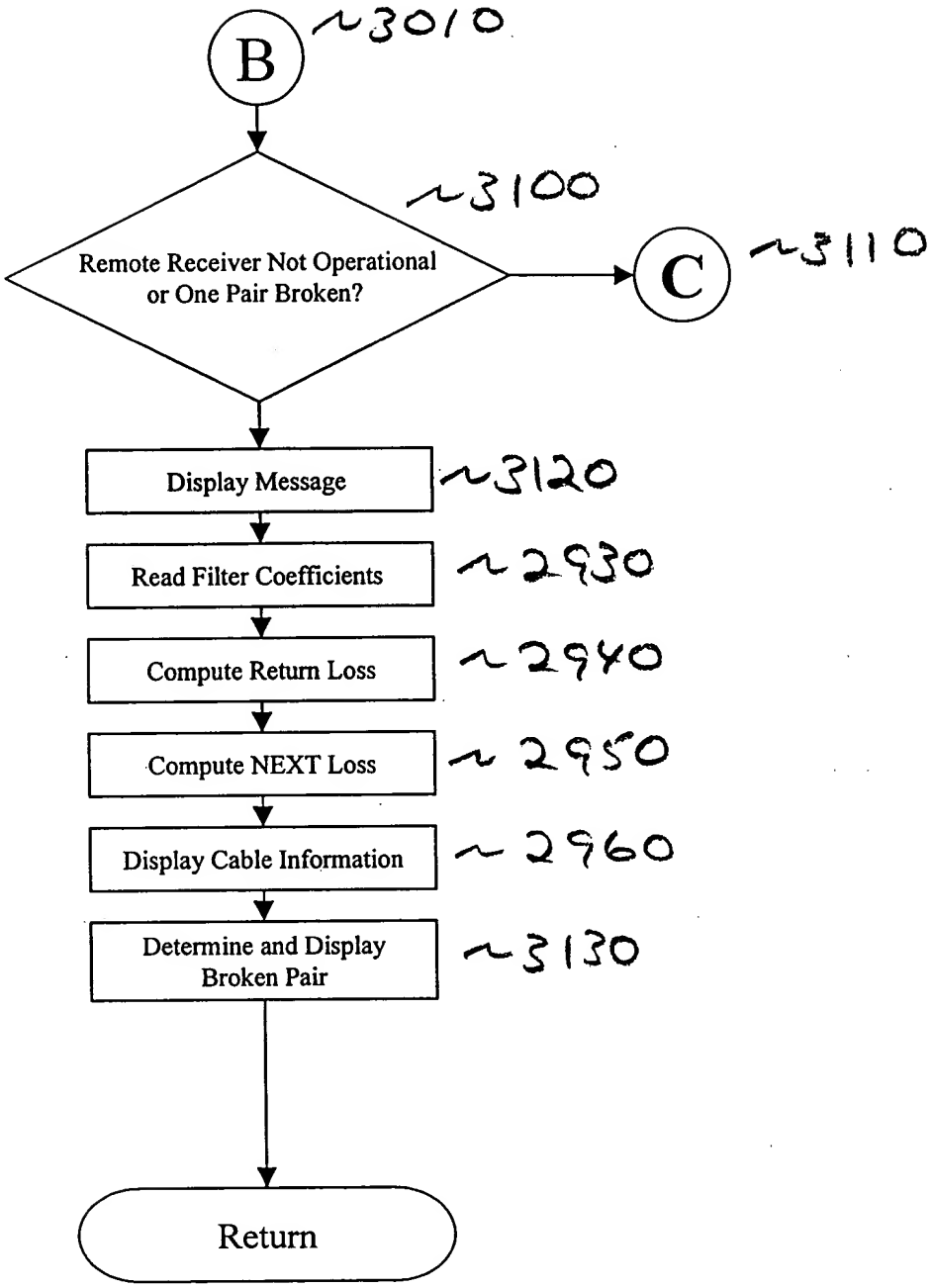
B
3010
3100
Remote Receiver Not Operational or One Pair Broken?
C
3110
Display Message
3120
Read Filter Coefficients
2930
Compute Return Loss
2940
Compute NEXT Loss
2950
Display Cable Information
2960
Determine and Display Broken Pair
3130
Return

FIG. 19

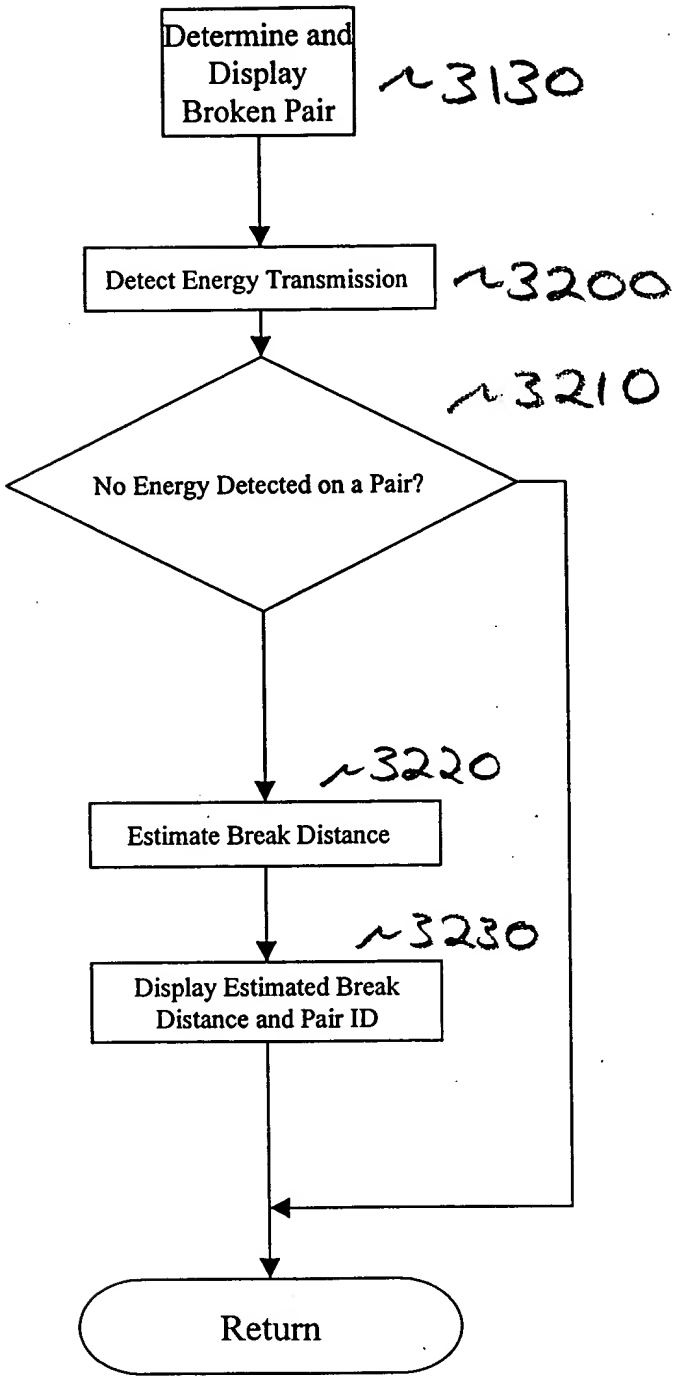
Determine and Display Broken Pair
3130
Detect Energy Transmission
3200
3210
No Energy Detected on a Pair?
3220
Estimate Break Distance
3230
Display Estimated Break Distance and Pair ID
Return

FIG. 20

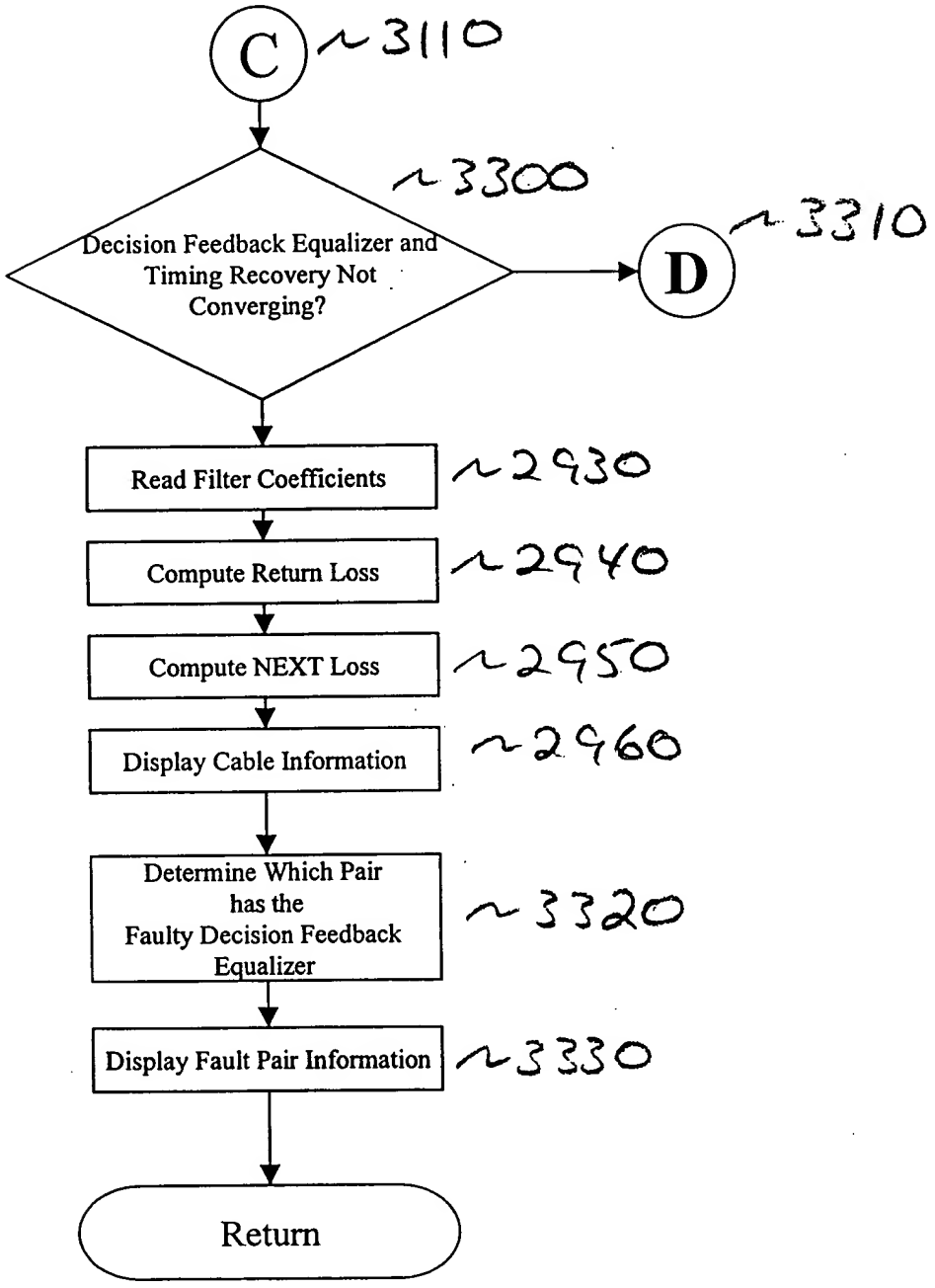
C
3110
3300
Decision Feedback Equalizer and Timing Recovery Not Converging?
D
3310
Read Filter Coefficients
2930
Compute Return Loss
2940
Compute NEXT Loss
2950
Display Cable Information
2960
Determine Which Pair has the Faulty Decision Feedback Equalizer
3320
Display Fault Pair Information
3330
Return

FIG. 21

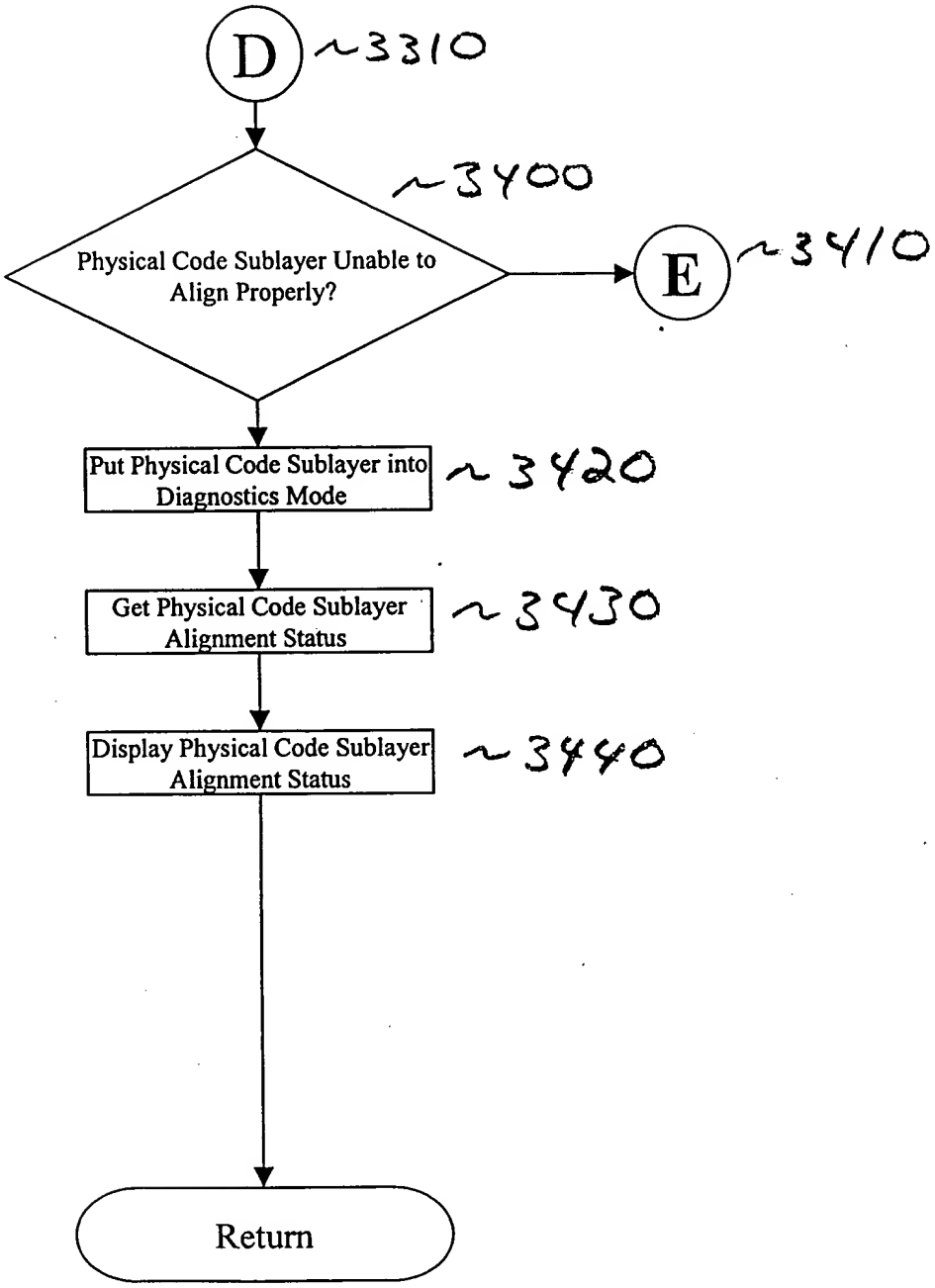
D
3310
3400
Physical Code Sublayer Unable to Align Properly?
E
3410
Put Physical Code Sublayer into Diagnostics Mode
3420
Get Physical Code Sublayer Alignment Status
3430
Display Physical Code Sublayer Alignment Status
3440
Return

FIG. 22

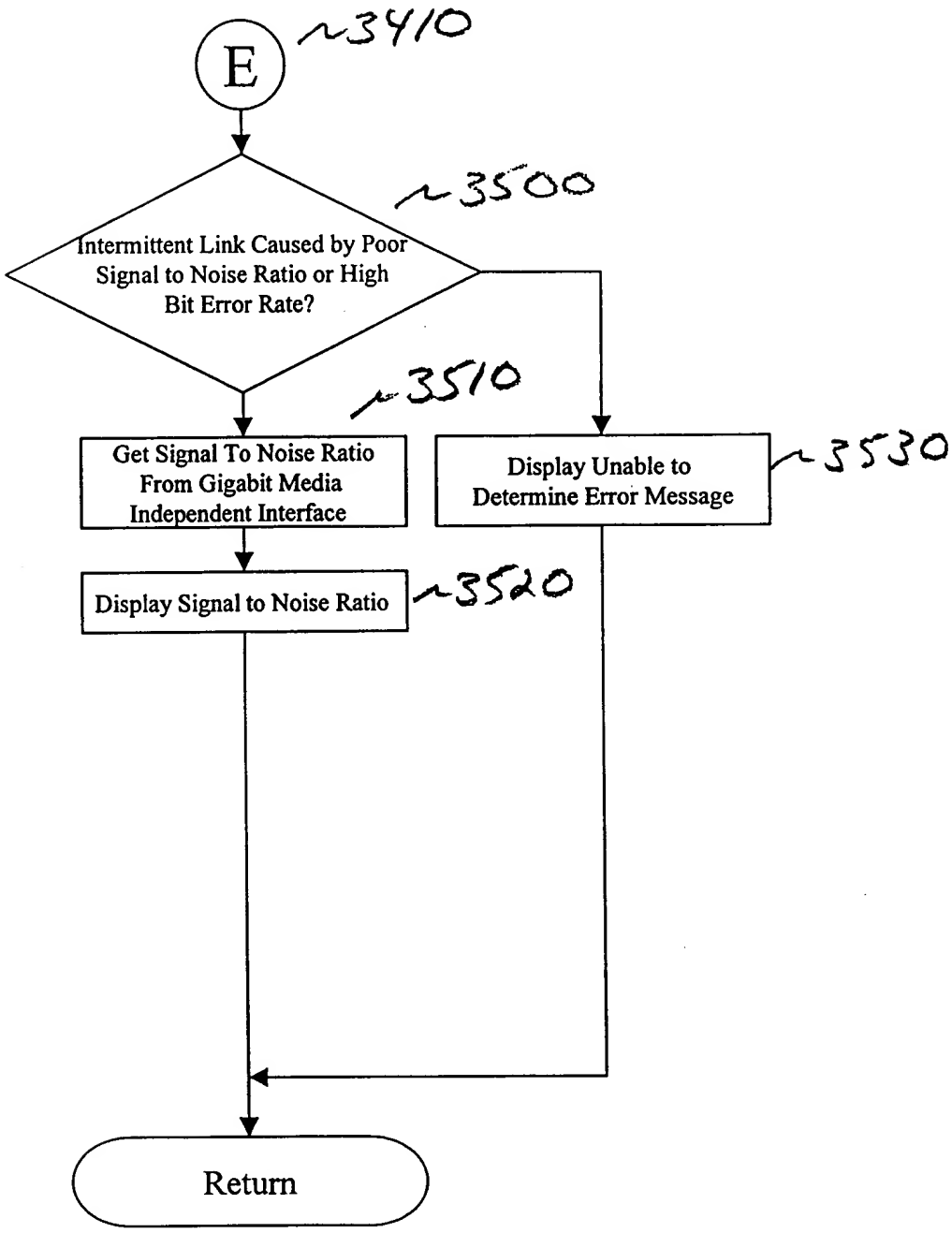
E
3410
3500
Intermittent Link Caused by Poor Signal to Noise Ratio or High Bit Error Rate?
3510
Get Signal To Noise Ratio From Gigabit Media Independent Interface
Display Unable to Determine Error Message
3530
Display Signal to Noise Ratio
3520
Return

FIG. 23